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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/734,201	12/15/2003	Donald L. Yates	M4065.0489/P489-A	4789

24998 7590 08/07/2007

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EXAMINER	
TSAI, H JEY	

ART UNIT	PAPER NUMBER
2812	

MAIL DATE	DELIVERY MODE
08/07/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/734,201	YATES ET AL.	
	Examiner	Art Unit	
	H.Jey Tsai	2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 March 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *22-33,40 and 41* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *22-33,40 and 41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 22, 25, 28, 31, 33 are rejected under 35 U.S.C. § 102(e) as being anticipated by Jones 6,555,858.

Jones teaches a magnetic random access memory structure comprising:

an insulating layer 218/224, fig. 4,

a planarized barrier layer (Ta or TaN etc) disposed over the insulating layer 218/224, col. 4, lines 52-58,

a plurality of longitudinally extending planarized conductive lines 228/229a/229b (a digit line) formed over an insulating layer 218/224 of a semiconductor substrate 200, col. 5, lines 5-30 and figs. 4-6,

a planarized conductive material layer 232 formed between the planarized conductive lines 228/229a/229b, barrier layer (Ta or TaN etc) and said first magnetic layers 234, col. 5, lines 18-67,

respective first magnetic layers 234 (a multilayer stacks) over the conductive lines 232, col. 5, lines 31-67,

an dielectric layer 236 of Al_2O_3, col. 5, lines 30-67,

respective second magnetic layers 238 or one more layer of multilayer stacks of layer 234 over the first magnetic layers 234, col. 5, lines 31-67,

regarding claims 25, 31, the insulating layer is SiO_2.

the conductive material layer is formed to a thickness of about 40-60 nm,

the conductive lines are formed in a trench formed in the substrate, fig. 4,

at least one magnetic random access memory (MRAM) cell 234, 236, 238, col. 5, lines 30-67 and figs. 6.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 22-33 and 40-41 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 43-67 of copending Application No. 10/196,933. Although the conflicting claims are not

identical, they are not patentably distinct from each other because an insulating layer formed between first and second magnetic layers for a MRAM device is obvious. The insulating layer serves as a tunneling layer for MRAM device. This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 22-33, 40-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ning 6,709,874, previously cited, in view of Durlam et al. 5,940,319, or Durlam et al. 6,211,090, newly cited.

The references discloses:

Ning teaches a magnetic random access memory structure comprising:

an insulating layer 210/110/112/212 having a plurality of grooves 114 formed therein, fig. 1-4,

a barrier layer 116 over the insulating layer 210/110/112/212 in each of plurality of grooves 114, figs. 1-4,

a plurality of longitudinally extending planarized conductive lines 118/218 formed over barrier layer 116 in each of plurality of grooves 114 the barrier layer 116 and the conductive lines having upper surface, col. 4, lines 40-67, col. 5, lines 18-26 , col. 6; lines 67 and figs. 1-4,

a planarized conductive material layer 120/220 formed over the upper (vertical) surfaces of the barrier layer 116 and upper surface of the conductive lines 118/218, fig. 3,

or, a planarized conductive material layer (a bottom layer PtMn or Ru of stack 222) formed over the upper (horizontal/cross-sectional) surfaces of the barrier layer 116 and upper surface of conductive lines 118/218, fig. 3, note: magnetic stack layer 222 includes PtMn/CoFe/Ru/NiFe/dielectric Al_2O_3/a plurality of magnetic layer, col. 6, lines 49-67,

respective first magnetic layers (NiFe of second bottom metal stack of stack layer 222) over the conductive lines 18/218, note: magnetic stack layer 222 includes PtMn/CoFe/Ru/NiFe/dielectric Al_2O_3/a plurality of magnetic layer, col. 6, lines 49-67,

respective second magnetic layers (top metal stack of stack layer 222, a plurality of magnetic layer formed over Al_2O_3) over the first magnetic layer NiFe, col. 7, lines 4-13,

a nonmagnetic layer Al_2O_3 between the first and second ferromagnetic layers (NiFe and plurality of magnetic layer of stack layer 222), col. 7, lines 103,

a planarized conductive material layer 120/220 formed between the first planarized conductive lines 118/218 and barrier layer 116 and the first magnetic layers NeFi of stack layer 222, col. 5, lines 33-67 and col. lines 41-67,

regarding claims 23, 24, 29, 30, the conductive material layer 120/220 is selected from the group consisting of tantalum (Ta), titanium (Ti), titanium-tungsten

(TiW), and titanium nitride (TiN), col. 5, lines 39-45 and the material layer is a resistive material (heavy refractory metal),

regarding claims 25, 31, the insulating layer is SiO_2.

Regarding claims 26, 32, the conductive material layer is formed to a thickness of about 10 nm to about 150 nm,

Regarding claims 27, 33, the conductive material layer is TaN, see col. 5, lines 15-25 of Durlam et al.

Regarding claims 40, 41, the first magnetic layers formed over the conductive layer 118/218 and barrier layer. Fig. 4.

the conductive lines are formed in a trench formed in the substrate 110/210,

at least one magnetic random access memory (MRAM) cell 222, col. 2, lines 33-67 and figs. 4.

The difference between the references applied above and the instant claim(s) is: Ning teaches planarized conductive material formed between first magnetic layer and planarized conductive lines and over the upper (upper and cross-sectional) surface of the barrier layer and conductive lines. Duriam et al. '319, teaches at figs. 15-17, a diode conductive layer formed over the upper surface of the barrier layer 84 and conductive lines 82. Duriam et al. '090, teaches at figs. 7-9, a conductive layer 50 formed over the upper surface of the barrier layer 42 and conductive lines 46.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have recognized Ning's conductive material layer is formed over the barrier layer and conductive line or modified Ning's process by having conductive

material layer formed over the barrier layer and conductive lines as shown in the drawings of Durlam et al.

Claims 23-24, 26-27, 29-30, 32 and 40-41 are rejected under 35 U.S.C 103 as being unpatentable over Jones et al. as applied to claims 22, 25, 28, 31, 33 above, and further in view of Ning 6,709,874.

The difference between the references applied above and the instant claim(s) is: Jones teaches a planarized conductive material formed between first magnetic layer and planarized conductive lines but does not teach the specific range of thickness and the resistive material. However, Nine teaches at col. 5, lines 39-45 the conductive material layer 120/220 is selected from the group consisting of tantalum (Ta), titanium (Ti), titanium-tungsten (TiW), and titanium nitride (TiN), and the material layer is a resistive material (heavy refractory metal), the conductive material layer is formed to a thickness of about 10 nm to about 150 nm. The first magnetic layers formed over the conductive layer 118/218 and barrier layer see fig. 4.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the above references' teachings by using a high resistive refractory material and a specific thickness as taught by Ning et al. because resistive material and specific thickness will limit the current flow to form a low current MRAM cell.

Conclusions

Applicant's arguments filed Feb. 16, 2006 have been fully considered but they are not persuasive. Because Ning clearly teaches at fig. 4, cap metal layer formed over the upper (vertical) surface of barrier layer 116 and conductive lines 118/218. Ning also clearly teaches a conductive material layer formed from the bottom stack layer of stack 222 over the upper surface of barrier layer 116 and conductive line 118/218. And, Ning clearly teaches in figs. 1-4, a planarized barrier layer 116 formed over insulating layer 210/110/112, a planarized conductor 118/218 formed over the insulating layer 110/210/112/212, a planarized conductive lines 118/218 formed over an insulating layer 210/110/112/212 of a semiconductor substrate 100, a planarized conductive material layer 120/220 formed between the first planarized conductive lines 118/218 and barrier layer 116 and the first magnetic layers NeFi of stack layer 222. Jones et al. also clearly teaches at fig. 4-6, col. 5, lines 18-67, a planarized conductive material layer 232 formed over planarized conductive lines 228/229a/229b and barrier layer (Ta or TaN etc) 226, and the first magnetic layers 234 and first magnetic layer 234 formed over the planarized conductor 228/229a/229b.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to H. Jey Tsai whose telephone number is (571) 272-1684. The examiner can normally be reached on from 7:00 Am to 4:00 Pm., Monday thru Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael S. Lebentritt can be reached on (571) 272-1873.

The fax phone number for this Group is 571-273-8300.

hjt

8/1/2007

H. Jey Tsai
Primary Examiner
Patent Examining Group 2800